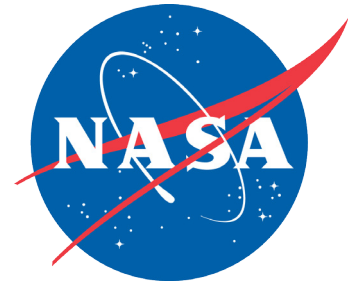


Spaceport News

John F. Kennedy Space Center - America's gateway to the universe



NASA

An aerial view shows the Launch Pad 39A area at Kennedy Space Center in 2006. NASA plans to issue an announcement for proposal in May for commercial use of the pad.

Commercial ops sought for pad 39A

By Rebecca Regan
Spaceport News

NASA released a synopsis May 17 announcing plans to issue an announcement for proposals for the commercial use of Launch Pad 39A at Kennedy Space Center. The announcement is expected next week.

Use of the launch pad by industry is designed to encourage commercial space activities along Florida's Space Coast and fully use the historic launch complex.

Launch Pad 39A originally

was designed to support NASA's Apollo Program and later was modified to launch space shuttles. Today, the agency is modernizing nearby Launch Pad 39B to support government and commercial launches, including NASA's heavy-lift Space Launch System (SLS) rocket and Orion spacecraft, which will provide an entirely new capability for human exploration beyond low-Earth orbit.

"We remain committed to right-sizing our portfolio by reducing the number of facilities that are underused, duplicative, or not required to support

the Space Launch System and Orion," said Kennedy Center Director Bob Cabana. "Launch Complex 39A is not required to support our asteroid retrieval mission or our eventual missions to Mars. But it's in the agency's and our nation's best interest in meeting our commitment and direction to enable commercial space operations and allow the aerospace industry to operate and maintain the pad and related facilities."

Assessments show Launch Pad 39A could serve as a platform for a commercial space

company's launch activities if the company assumes financial and technical responsibility of the complex's operations and management. Commercial use of the pad would further support NASA's goal to encourage the commercial use of property the agency does not need for the foreseeable future.

A dynamic infrastructure is taking shape, designed to host many kinds of spacecraft and rockets capable of sending people on America's next adventures in space.

Inside
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Engineers showcase



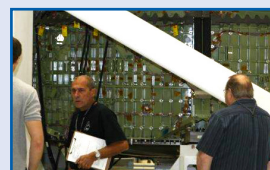
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Dream Chaser tests



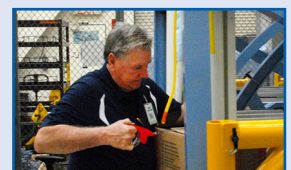
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Orion tackles tests



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Engineers focus on super-cold propellants

By Steven Siceloff
Spaceport News

Storing super-cold propellants is not easy on Earth, and it doesn't seem to be much easier to accomplish in space. That's not stopping engineers from trying to perfect technologies, though.

"The longest we've kept liquid propellants in orbit is a matter of hours in the size of large propellant stages like Apollo and Centaur," engineer Adam Swanger told an audience during a Kennedy Engineering Academy session at Kennedy Space Center.

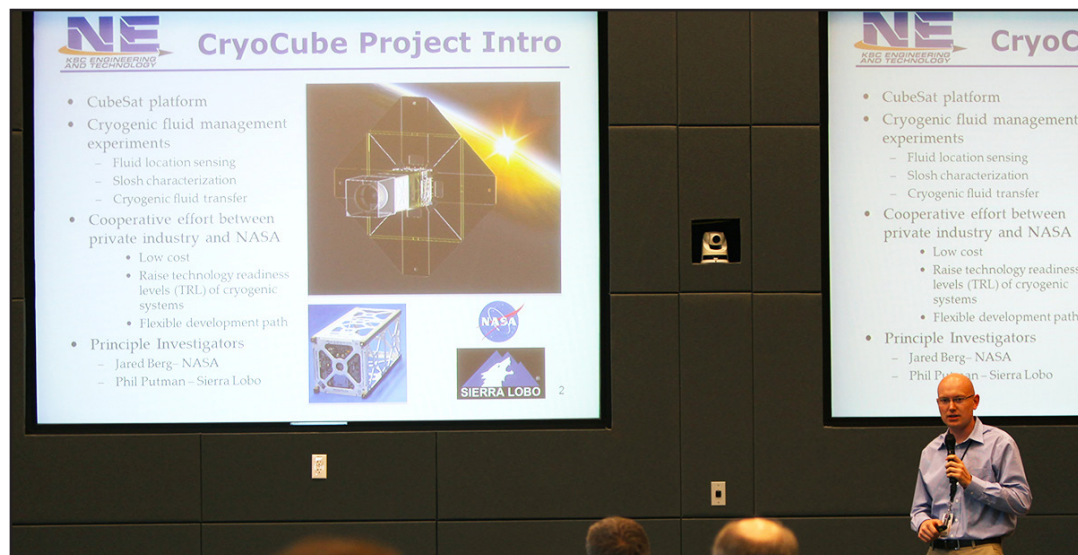
Some of NASA's far-reaching plans, most notably space-based fuel depots that would act as gas stations for interplanetary spacecraft, potentially would require the reliable storage of fuel and oxidizer for months at a time.

Before addressing these issues on a large scale, engineers are looking at promising techniques on a very small level as part of the academy's Accelerated Training Program (ATP). One approach requires the International Space Station, while the other is a CubeSat design that would fly free in orbit to show that super cold materials can safely be stored in space without boiling off.

ATP is a six-month assignment with on-the-job training opportunities and diverse and targeted work assignments designed to establish the ongoing work relationship, job maturity and technical expertise necessary to perform effectively within the organization. The program is based on internship, with direction from a mentor.

At the end, participants are required to complete a written project plan and formally present the project results to a board.

Although space often is thought of as a cold place,



NASA/Dimitri Gerondidakis

Jared Berg shows his design for a cubesat, called CryoCube-1, that would evaluate storage and movement of super-cold chemicals in space during a Kennedy Engineering Academy (KEA) Training Showcase inside the Operations and Support Building II on May 2.

satellites typically experience dramatic temperature swings of 500 degrees or more depending on whether they are in sunlight or not. Insulating liquid hydrogen, which at minus 423 degrees is one of the coldest materials known, poses a tremendous challenge to designers.

Swanger's experiment aims to liquefy and store the hydrogen and methane created by the life support system on the space station. Now, the excess chemicals are vented from the station regularly to disperse in space. If it works, it would be a first, since researchers have not tried to liquefy gases in space before, Swanger said.

"The idea is, if we somehow could capture these commodities, plumb them back into an experiment, we would then be able to liquefy them using a cryo-cooler and test zero boil-off and test microgravity liquefaction technologies," Swanger said.

The proposal calls for a device to be placed on the Japanese Experiment Module's exposed pallet, the platform on the Kibo scientific lab module that is open to space.

Swanger said the pallet loca-

tion offers power and cooling feeds to the experiment, and also is close to the NASA-built Tranquility module where the excess chemicals are produced. Helium would be used in heat exchangers to cool the materials the same way a refrigerator uses water to cool air.

"We think with further refinement it will prove that it is feasible to liquefy the gaseous hydrogen and methane flow from the system on the International Space Station," Swanger said.

Jared Berg's focus was to create a tiny storage facility a bit smaller than a shoebox that could be launched as a secondary payload and operate on its own, keeping the chemicals inside cold.

The spacecraft, slated for launch in 2014, is called CryoCube-1 and uses the proven architecture of the experimental nanosatellites known as CubeSats. The cube would have fold-out sunshields and solar arrays on each end, along with doors that would open and close to either release heat from around the six-centimeter-diameter tank or shield it further from warm sunlight.

Instruments on the satellite will gauge how the liquid behaves in space.

"The ATP study was to prove that we could get temperatures low enough to condense oxygen on a satellite," Berg said. "We wanted to see how sensitive the (satellite) would be."

Kurt Smith's ATP effort centered on a concept for ground support equipment needed for NASA's Space Launch System (SLS), a massive rocket comparable to the Saturn V. Smith worked on a design to retract a 1,500-pound plate that will hold umbilical lines to the rocket during processing and countdown, but safely pull away as the rocket lifts off.

"One of the things we try to do is keep the designs as simple as possible," Smith told the group.

Smith said he employed a childhood erector set to test his different thoughts, along with the numerous design tools available to engineers.

The ATP session took the design through a third of its development. Future work will refine the mechanism until it's complete and helping an SLS into space.



CLICK ON PHOTO

NASA/Tom Tschida

With its wings and tail structure removed and shrouded in plastic wrap for ground transport, Sierra Nevada Corporation Space Systems' Dream Chaser engineering test article is hauled across the bed of Rogers Dry Lake at Edwards Air Force Base, Calif., to Dryden Flight Research Center on May 15. The Dream Chaser will begin its approach-and-landing flight test program in collaboration with NASA's Commercial Crew Program this summer. To watch a video of the Dream Chaser's arrival, click on the photo.

Dream Chaser tests ongoing at two centers

By Rebecca Regan
Spaceport News

As part of NASA's Commercial Crew Program (CCP) agreements, Sierra Nevada Corporation (SNC) Space Systems made significant strides this week on opposite coasts of the United States.

On the West Coast, SNC's Dream Chaser flight vehicle arrived at NASA's Dryden Flight Research Center in Edwards, Calif., May 15 to begin tests of its flight and runway landing systems.

Tests at Dryden will include tow, captive-carry and free-flight tests of the Dream Chaser. A truck will tow the craft down a runway to validate performance of the nose strut, brakes and tires. The captive-carry flights will further examine the loads it will encounter during flight as it is carried by an Erickson Skycrane helicopter. The free flight later this year will test Dream Chaser's aerodynamics through landing.

The tests are part of pre-negotiated, paid-for-performance milestones with CCP, which is

primarily based at Kennedy Space Center. CCP is facilitating U.S.-led companies' development of spacecraft and rockets that can launch from American soil. The overall goal of CCP is to achieve safe, reliable and cost-effective U.S. human access to and from the International Space Station and low-Earth orbit.

On the east coast, several NASA astronauts were at the agency's Langley Research Center in Hampton, Va., to fly simulations of a Dream Chaser approach and landing to help evaluate

the spacecraft's subsonic handling. The test measured how well the spacecraft would handle a number of atmospheric conditions and assessed its guidance and navigation performance.

"Unique public-private partnerships like the one between NASA and Sierra Nevada Corporation are creating an industry capable of building the next generation of rockets and spacecraft that will carry U.S. astronauts to the scientific proving ground of low-Earth orbit," said William Gerstenmaier, NASA's associate administrator for human exploration and operations in Washington. "NASA centers around the country paved the way for 50 years of American human spaceflight, and they're actively working with our partners to test innovative commercial space systems that will continue to ensure American leadership in exploration and discovery."

The Dream Chaser space system is based on Langley's Horizontal Lander-20 (HL-20) lifting-body design concept.

The design builds on years of analysis and wind tunnel testing by Langley engineers during the 1980s and 90s. Langley and SNC joined forces six years ago to update the HL-20 design in the Dream Chaser orbital crew vehicle. In those years, SNC worked with the center to refine the spacecraft design. SNC will continue to test models in Langley wind tunnels. Langley researchers also helped develop a cockpit simulator at SNC's facility in Louisville, Colo., and the flight simulations being assessed at the center.

NASA is partnered with SNC, Space Exploration Technologies (SpaceX) and The Boeing Company to meet CCP milestones for integrated crew transportation systems under the Commercial Crew Integrated Capability (CCi-Cap) initiative. Advances made by these companies under their funded Space Act Agreements ultimately are intended to lead to the availability of commercial human spaceflight services for government and commercial companies.



CLICK ON PHOTO

NASA/David C. Bowman

Bruce Jackson, an aerospace engineer at NASA's Langley Flight Research Center, briefs astronauts Rex Walheim and Gregory Johnson as they evaluate Sierra Nevada Corporation's Dream Chaser landing simulation, in support of NASA Commercial Crew Program efforts, Wednesday, May 15. The simulation makes use of the Synthetic Vision SV and Enhanced Vision EV systems in the center's Cockpit Motion Facility. For more information about NASA's Commercial Crew Program, click on the photo.

Upgraded ML will carry SLS to Pad 39B

By Linda Herridge
Spaceport News

NASA's Space Launch System (SLS) heavy-lift launch vehicle will be carried to Launch Pad 39B at Kennedy Space Center atop an upgraded mobile launcher (ML) for missions to near-Earth asteroids, Mars and other new destinations in the solar system.

The agency has awarded a contract to J.P. Donovan Construction Inc. of Rockledge, Fla., to modify the ML, which is one of the key elements of ground support equipment that is being upgraded by the Ground Systems Development and Operations (GSDO) Program office at Kennedy to carry the SLS rocket for its first mission in 2017.

The work under the firm fixed-price contract will begin at the end of this month and is targeted to be completed in 18 months.

"Completing more of the work sooner will create more time to validate systems later as the first launch date approaches for the new SLS vehicle," said Mike Canicatti, the technical integration manager in the GSDO Program Office at Kennedy.

The mobile launcher that currently is positioned near the Vehicle Assembly Building originally was constructed in 2008 and 2009, and now will be structurally modified to meet requirements for NASA's new mission.

The major work to be completed under this contract is widening the exhaust space in the mobile launcher base to support two solid rocket boosters and four main engines. Essentially, the exhaust hole will be increased from an approximate 24-by-24-foot space to a 32-by-65-foot space.

Upgrades to the ML are part



NASA file/2011

The mobile launcher (ML) is shown on the crawlerway at Kennedy Space Center on Nov. 30, 2011. The ML will be upgraded beginning in June 2013 to support NASA's Space Launch System heavy-lift rocket.

of Kennedy's efforts to expand its ground support infrastructure to support the SLS rocket and a variety of other launch vehicles.

When this contract is completed, another contract will begin to install the umbilicals, access arm and other ground support equipment

on the mobile launcher.

"We're on a tight schedule to get everything in place on the mobile launcher and check 47 different subsystems," Canicatti said.

Midwest Steel Inc. of Detroit will be a major subcontractor to J.P. Donovan Construction.

The flight test in 2017 will

send an uncrewed Orion spacecraft into lunar orbit. NASA's asteroid initiative, which is part of the agency's proposed budget request for fiscal year 2014, will use SLS and Orion to send astronauts to study a small asteroid that will have been redirected robotically to a stable orbit near the moon.

Scenes Around Kennedy Space Center



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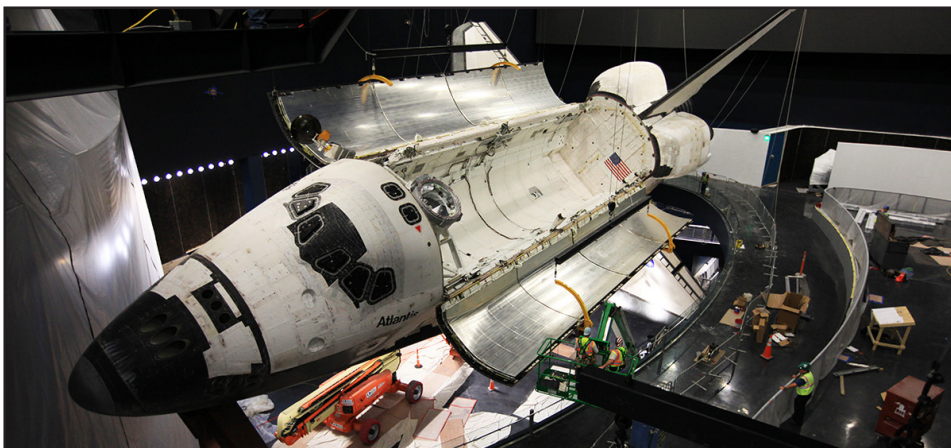
Photo courtesy of Rocketman Florida Triathlon

Melissa Stockwell, the first female amputee of the Iraq War, passes by Launch Pad 39A during the Rocketman Florida Triathlon on May 5. She placed in the top 40 percent of the female competitors. Stockwell, also a three-time paratriathlon world champion, received the Purple Heart and Bronze Star for her service.



NASA/Jim Grossmann

Kennedy Space Center Director Bob Cabana, right, met with representatives of PaR Systems Inc. on May 10, including Brian Behm, president of the company's Robotics Division. NASA recently established a partnership agreement with PaR to operate the Hangar N facility and its non-destructive testing equipment located at Cape Canaveral Air Force Station, adjacent to Kennedy.



NASA/Jim Grossmann

At the Kennedy Space Center Visitor Complex on May 10, technicians monitor space shuttle Atlantis as its payload bay doors are fully opened. Atlantis is being prepared for display in the "Space Shuttle Atlantis" exhibit, a 90,000-square-foot facility, scheduled to open June 29, 2013.



NASA/Jim Grossmann

Kennedy Space Center Director Bob Cabana, right, mingled with members of the National Space Club Florida Committee on May 14 at the Radisson Resort at the Port in Cape Canaveral, Fla., before his presentation on the the Fiscal Year 2014 Budget and Kennedy's path forward. From left are Smokey Stover, Abacus Technology deputy program manager; Melvina Gasco, Boeing manager, state and local government operations; and Margo Witcher, Lockheed Martin Space Systems Company spokeswoman.



NASA/Daniel Casper

Mexican culture and food were highlighted during a rain-delayed Cinco de Mayo celebration May 9 at KARS Park II. The event featured Latin music, dancing lessons, refreshments and a salsa recipe competition.

Orion crew module undergoes static loads test

By Linda Herridge
Spaceport News

Completely surrounded by a massive 20-foot-high structure called the crew module static load test fixture, the Orion crew module is being put through a series of tests that simulate the massive loads the spacecraft would experience during its mission.

Orion is NASA's new exploration spacecraft, designed to carry humans farther into space than ever before. During its first flight test next year, Exploration Flight Test-1 (EFT-1), it will travel 3,600 miles into space and return to Earth. This will allow NASA to evaluate Orion's performance in preparation for future deep-space journeys.

Lockheed Martin Space Systems began static loads testing May 3 on the Orion EFT-1 crew module inside the Operations and Checkout (O&C) Building at Kennedy Space Center. Technicians are using cylinders to slowly apply pressure to various areas of the vehicle to simulate the loads it will be exposed to at different phases of the mission.

The tests will run throughout May and June, with different phases simulating launch, ascent, launch abort, launch abort system separation, re-entry and landing. Lockheed Martin is conducting the tests based on a set of prototype flight requirements.

"The set of tests are critical to build the foundation for the future of spaceflight."

Steve Cook,
Lockheed Martin Project Orion
mechanical test engineer lead



CLICK ON PHOTO

NASA/Kim Shiflett

In April, the Orion crew module for Exploration Flight Test-1 was secured in a special test stand and a platform was installed on top inside the Operations and Checkout Building high bay. NASA and Lockheed Martin engineers and technicians are running a series of tests, called static loads tests, to verify the integrity of the spacecraft.

"We perform these tests to ensure the structural integrity of the crew module," said Carlos Garcia, a test engineer in the Orion Production Office at Kennedy.

During the months and weeks leading up to the static tests, NASA and Lockheed Martin engineers and technicians configured Orion for its placement on the test fixture and staged the associated equipment and hardware that would be needed to verify Orion is one step closer to

being flight ready.

The pressurized crew module will be put through a series of eight different load tests, each one taking up to three days to complete. Each test will focus on a different area of the crew module and require a different configuration of the hydraulic actuators attached to it.

"The first four tests represent the ascent regime and the last four represent the re-entry flight regime," Garcia said.

One of the tests also will allow engineers to test repairs

they made to cracks in the crew module's aluminum bulkhead that occurred last November. The cracks appeared as the vehicle was being pressurized for a proof pressure test aimed at verifying the vehicle's structural integrity and validating engineering models used to design it.

These tests provide an opportunity to repeat the proof pressure tests to ensure that repairs will hold.

More than 1,600 strain gauges have been attached to Orion's external surface and inside the crew module to verify the crew cabin structure. Cameras have been placed around Orion to record any movement during the load tests.

Several other sensors have been attached at various locations around and beneath Orion to measure any deflection or expansion during the repeat of the proof pressure test.

"The set of tests are critical to build the foundation for the future of spaceflight," said Steve Cook, the Lockheed Martin Project Orion mechanical test engineer lead. "We learn from our successes and challenges."

Lockheed Martin and NASA engineers will monitor the tests from the control room in the completely refurbished lower level of the high bay, called the "tunnel," to fully execute the tests and compare the results with stress model predictions.

The O&C serves as the final assembly and checkout facility for Orion.

EFT-1 is scheduled to launch atop a United Launch Alliance Delta IV heavy rocket from Space Launch Complex 41 at Cape Canaveral Air Force Station in 2014. The agency's Space Launch System rocket will begin launching Orion in 2017.

Entrepreneur gives shuttle truss new uses

By Steven Siceloff
Spaceport News

A truss design devised to help workers process space shuttles continues to find new uses as a space shuttle engineer-turned-entrepreneur adapts it to everything from a solar-powered electric generator to a mobile cellphone tower.

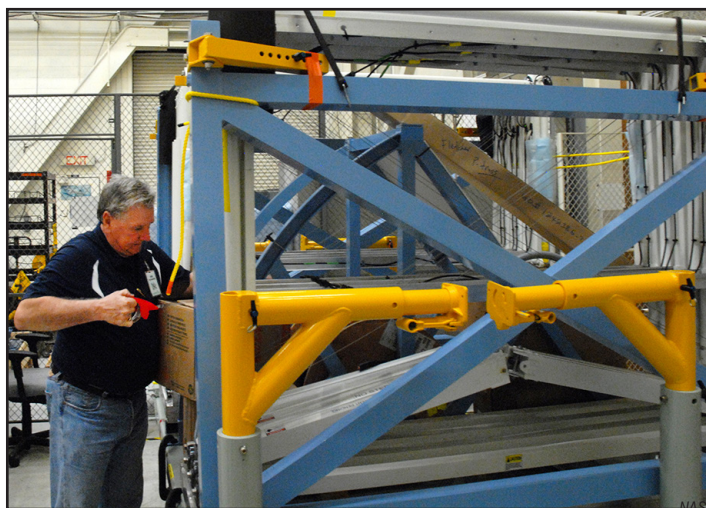
The structure, which is constantly being redesigned into smaller packages that unfold to larger sizes, also is envisioned for Mars or other space destinations where it could be deployed to connect modules for astronauts.

Jim Fletcher, who worked for United Space Alliance during the space shuttle era, began working on the truss 10 years ago and started a company two years ago called CPI Technologies dedicated to producing them.

He is working closely with the Florida Solar Energy Center in Cocoa and the Space Coast Energy Consortium to refine the design since it is clean and renewable energy.

The design began life as an extendable work platform that would reach over the shuttle's cargo bay.

"We were trying to come up with a way to reach out and retrieve something while the shuttle was out at the pad so we wouldn't have to roll it back to the Vehicle Assembly Building



Jim Fletcher packs the prototype solar power generator inside the Vehicle Assembly Building at Kennedy Space Center on May 3.

(VAB)," Fletcher said.

Engineers built a truss that ultimately was put to use in the Orbiter Processing Facility, spanning the cargo bay.

From there, Fletcher built a portable solar-powered electric generator that stretched two pair of 21-foot-long trusses out from the center, complete with solar panels that locked into the top. He demonstrated the concept by deploying the prototype in the VAB parking lot where it generated enough electricity to power a house, except the air conditioning.

Fletcher returned to the VAB recently, where the truss has been stored, to collect NASA's prototype for demonstrations at the FSEC in Cocoa since it is clean and renewable energy. The prototype will be made into

a fully operational model and returned to NASA.

Since the first model was made, Fletcher has built a few more advanced versions that open longer and wider and produce more electricity while taking up no more folded space than the original.

"You'd have a 165-foot array on a trailer the same size as this," Fletcher said. "It can produce 10 kilowatts of peak power."

Part of Fletcher's adjustments to the design include making the individual sections, or bays, of the truss able to unfold independent of the other sections so the truss can be varied in its size. The original design, in which all the truss sections had to be unfolded before any could lock in, met a standard requirement

for space.

"In space, it's a good thing because you can use one mechanism to deploy the whole thing. On the ground, it's not necessarily an advantage," Fletcher said. "The new design makes it easier to deploy in a rough environment."

Thanks to interest from India and South Africa, Fletcher is looking to take the truss vertical. Extending 100 feet up from a six-foot-high box, the truss is strong enough to hold cell phone equipment and the solar panels to power them.

As the Earth-bound business takes shape, Fletcher has not given up on putting the concept to work in orbit or on other worlds.

"We had in mind all along deploying this thing in space, or at least a one-sixth or one-third gravity environment," Fletcher said.

With robust connections, a strong frame and the flexibility to deploy it in different ways, Fletcher said the truss is a good fit for NASA's exploration plans. The mechanism could serve as the basis for an unfolding crew module in space, for example, or a frame for a small base on Mars.

At the moment, though, Fletcher and the consortium are working the business through the early stages of growth.

"It's been a good experience, it's really challenging," Fletcher

said.



NASA file/2011

The solar power generator prototype was unfolded in the Vehicle Assembly Building parking lot in 2011. Since then, the design has been modified to make a larger array that produces more electricity and folds up into the same amount of space.

Looking up and ahead . . .

** All times are Eastern*

2013

May 28

Mission: Expedition 36/37

Launch Vehicle: Soyuz TMA-09M

Launch Site: Baikonur Cosmodrome, Kazakhstan

Launch Window: 4:31 p.m.

Description: Soyuz TMA-09M will carry three Expedition 36/37 crew members to the ISS.

June 5

Mission: ISS Automated Transfer Vehicle 4

Launch Vehicle: Ariane 5

Launch Site: Guiana Space Centre, French Guiana

Launch Pad: ELA-3

Description: The European Space Agency's ATV-4, also known as the "Albert Einstein," will deliver several tons of supplies to the ISS, docking with the Zvezda Service Module on the Russian segment of the station June 15.

June 26

Mission: Interface Region Imaging Spectrograph (IRIS)

Launch Vehicle: Pegasus XL

Launch Site: Vandenberg Air Force Base, Calif.

Launch Window: 10:25:04 to 10:30:04 p.m.

Launch Time: 10:27:34 p.m.

Description: IRIS is designed to provide significant new information to increase our understanding of energy transport into the sun's corona and solar wind and provide an archetype for all stellar atmospheres.

July 24

Mission: ISS Resupply

Launch Vehicle: ISS Progress 52

Launch Site: Baikonur Cosmodrome, Kazakhstan

Description: Progress 52 will carry supplies, hardware, fuel and water to the ISS.

Aug. 12

Mission: Lunar Atmosphere and Dust Environment Explorer (LADEE)

Launch Vehicle: Minotaur V

Launch Site: Wallops Flight Facility, Va.

Launch Pad: Mid-Atlantic Regional Spaceport Pad 0B

Description: LADEE will gather detailed information about conditions near the surface and environmental influences on lunar dust. A thorough understanding of these influences will help researchers understand how future exploration may shape the lunar environment and how the environment may affect future explorers.

Sept. 25

Mission: Expedition 37/38

Launch Vehicle: Soyuz TMA-10M

Launch Site: Baikonur Cosmodrome, Kazakhstan

Description: Soyuz TMA-10M will carry three Expedition 37/38 crew members to the ISS.

Oct. 16

Mission: ISS Resupply

Launch Vehicle: ISS Progress 53

Launch Site: Baikonur Cosmodrome, Kazakhstan

Description: Progress 53 will carry supplies, hardware, fuel and water to the ISS.

To watch a NASA launch online, go to <http://www.nasa.gov/ntv>.

NASA Spinoffs: Did You Know?



NASA

Expedition 29 Commander Mike Fossum scans Japan Aerospace Exploration Agency crew member Satoshi Furukawa using the Ultrasound 2 on the International Space Station. The controller is about the size of a laptop computer.

Astronauts have limited equipment for performing medical checks on the International Space Station. Tools at most doctors' disposal -- such as MRIs, CT scanners and even X-ray machines -- are too bulky to carry to space. A doctor at the Henry Ford Hospital in Detroit had the solution.

Dr. Scott Dulchavsky, chair of the Department of Surgery and professor of surgery, molecular biology and genetics at Wayne State University School of Medicine in Detroit, taught them how to operate a portable ultrasound for use aboard the space station.

The technology originally designed to transmit ultrasound data quickly from the orbiting outpost to Earth is helping patients on the ground, too. A company called Mediphan of Ottawa, Ontario, Canada, can compress and transmit high-quality ultrasound images rapidly for doctors to examine at a distance. In April, the company's successful technology spinoff from space station research was inducted into the 2013 Space Technology Hall of Fame. The Hall of Fame honors world-class technology and those who transform technology originally developed for space exploration into products that help improve the quality of life on Earth.

For more about NASA Spinoffs, go to <http://www.nasa.gov/spinoffs>.



John F. Kennedy Space Center

Spaceport News

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